The collapse of Tacoma Narrows Bridge: a piece to the puzzle

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Publication date:
2017

Document Version
Publisher's PDF, also known as Version of record

Log #DFD17-2017-000860

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Sorting Category: 37. (C)

The collapse of Tacoma Narrows Bridge: a piece to the puzzle[1] J. H. WALTHER, D. S. CHRISTENSEN, M. G. MALTHE, M. ROENNE, H. J. SPIETZ, Technical University of Denmark, A. LARSEN, COWI a/s, S. V. LARSEN, FORCE Technology — On Nov. 7th 1940 the newly constructed Tacoma Narrows Bridge collapsed due to excessive torsional oscillations caused by the formation and shedding of large coherent vortices. The subsequent wind tunnel tests conducted on both section- and full bridge models concluded that the bridge should have collapsed at a wind speed corresponding to approximately half of the wind speed at the day of the collapse. This discrepancy questions our understanding of the phenomena responsible for the failure of the bridge. The present study aims at clarifying this "mystery" by considering historical records made available by the US coast guards, and by performing wind tunnel tests and detailed numerical flow simulations. Our findings indicate that the discrepancy is caused by an until now unnoticed yawed wind direction relative to the bridge, which was present at the day of the collapse.

[1]Danish Council for Independent Research grant no. 4184-00349B

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[X] Prefer Oral Session
[ ] Prefer Poster Session

Date submitted: 28 Jul 2017 Electronic form version 1.4